



Increasing the Circularity of Hotel Textiles



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by

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Executive summary

About the project

The City of Copenhagen is a partner in EU's Urban Waste project, which aims to develop waste prevention and management strategies in European cities with high levels of tourism. PlanMiljø was commissioned by the city to map the consumption, use and management of textiles in hotels in Copenhagen and the potential for increasing the circularity of textiles. The study has primarily made use of information collected directly from hotels, used textile collectors and leasing companies. Hotel chains and hotels representing 61% of all hotels in Copenhagen, took part in the survey.

Consumption of textiles

An estimated 479 tonnes (approx. 14 kg per hotel bed) of hotel bed linen, kitchen textiles and uniforms/ workwear are in circulation in Copenhagen with approximately 121 tonnes (approx. 3.5 kg per hotel bed) of new textiles purchased each year leading to 3000 tonnes of CO₂ emissions during production. More than 90% (by weight) of hotel textiles are leased. The textiles that hotels are most likely to own are uniforms for reception, bar and management staff (46% of hotels). All bedlinen and guest towels are leased.

Circularity in hotels textiles

Greater circularity in hotel textiles means 1) keeping textiles in service for as long as possible through durable design, repair, recirculation within a hotel and subsequently 2) ensuring that eventually discarded textiles and the materials they contain, gain a further life through reuse/recycling

Although the vast majority of hotel textiles are leased, both hotels and leasing companies can take leading roles in ensuring circularity. Leasing companies can provide more durable textiles and ensure that these are recirculated for reuse and/or recycling when the hotel no longer wants them. Hotels can place requirements in leasing contracts to ensure that leasing companies follow circularity principles, and can simultaneously ensure circularity in the uniforms/workwear that they own.

Current status of circularity

For the majority of hotels, it is the leasing companies that are currently driving the circularity dialogue. Although many hotels have environmental policies and choose eco-labelled textiles and laundries, far fewer think of circularity when purchasing, managing and discarding their textiles or when tendering for leasing services.

Leasing companies are actively promoting more durable textiles to hotels and attempting to find recycling and upcycling opportunities for discarded textiles. They also recirculate towels that no longer live up to luxury hotels standards to mid-range hotels. Durability is central to leasing companies' business models, whereas for luxury hotels in particular, comfort has higher priority. This can sometimes mean selecting less durable fibres such as 100% cotton.

However, one large chain places significant focus on durability for uniforms and uses grey rather than white bedlinen to reduce the risk of stains and extend product lifetimes. A further chain carries out



in-house repairs of their own textiles. Moreover, an encouraging 71% of hotels retain and recirculate used uniforms/workwear released through changes in staff.

Only 44% of hotels, however, report donating some of their discarded (own) textiles to used textile collection organisations for reuse and/or recycling, in part due to lack of central policy and lack of time/capacity amongst staff for taking textiles to clothing banks.

All actors - hotels, leasing companies and used textile collectors - are challenged by restricted markets for reuse and recycling of hotel textiles and workwear. The following solutions have been found for discarded textiles but many of these remain niche:

- Recycling of bedlinen and other textiles with minimum 50% cotton into industry wipes
- Reuse of sets of uniforms in businesses/organisations in sub-Saharan Africa
- Direct donation of bed linen and towels for reuse in homeless shelters/hospitals/hospices
- Upcycling of discarded guest towels to cleaning or kitchen cloths for resell to hotels
- Upcycling of tablecloths into kitchen uniforms.

These markets are challenged by low prices for recycled materials, high costs of labour, non-removable logos or distinctive uniform design, zips and buttons, fibre blends.

Recommendations for hotels - Maximising the first use

General

- Prioritise durability when selecting and designing textiles. Choose fibres and blends that can resist wear and tear and laundry processes and darker colours to reduce effects of staining.
- Carry out tests of durable workwear with your staff to ensure comfort. Involve them in discussions of durability and its benefits for economy and environment.
- If using logos on textiles, ensure that these can be easily removed and replaced if the hotel should undergo a rebranding
- If introducing a new style of workwear, continue to use the existing supply of the phased-out style until these are completely used. Avoid using new styles that stand out too strongly from the old.

Owned textiles

- Develop criteria for wear and tear, that allocated members of staff in housekeeping/ laundries can use to determine when a textile product is no longer fit for service
- Adopt a take-back, storage and recirculation system for uniforms/workwear to cope with staff turnover
- Provide a repair station and train member(s) of staff in simple repairs

Leased textiles

- Identify whether a repair service can be included in your contract with leasing companies
- Include a clause in leasing contracts that you can purchase the textiles that have been in your service) at the end of a contract period, in case you wish to change leasing service providers



Recommendations for hotels - Gaining value from discarded textiles

General

- Procure or lease textiles with recycled content where this doesn't conflict with durability/comfort
- Discuss with your leasing company or used textile collectors options for upcycling of your discarded textiles to new textile products for use in your hotel e.g. tablecloths to kitchen uniforms, guest towels to dishcloths or cleaning cloths etc.
- Avoid logos that are printed or embroidered on to your textiles. Use easily removable logos.
- Use textiles that are based on single fibres types but only if this doesn't compromise durability
- Avoid unnecessary zips, buttons and other details on textiles. Use neutral designs where possible.

Owned textiles

- Adopt systems and allocate responsibility to ensure that all owned textiles no longer fit for service are centrally collected with a view to reuse/recycling
- Some workwear suppliers have begun operating take-back and recycling systems for their workwear. See if your supplier offers this. If not encourage them to do so.
- Discuss with used textile collection organisations, possibilities for in-house collection

Leased textiles

- Consider placing requirements for reuse and recycling of leased textiles that are no longer fit for service in leasing contracts. Use market dialogue to ensure that these are realistic and measurable.

Textiles left behind by guests

It is estimated that guests leave 10 tonnes of textiles behind each year in Copenhagen's hotels. After a storage period of 6 weeks to 6 months, most hotels either donate these to textile collection banks or deliver them to the police lost and found as required by Danish law. Copenhagen's Police, however, report incinerating all textiles delivered to them due to lack of capacity to check pockets for sensitive personal data prior to donating them.

Recommendations for hotels – Lost and found textiles

- Check whether there is national law requiring delivery of all unclaimed items to the police
- If there is:
 - set up a system and responsibility in individual hotels to ensure this happens following the normal storage period
 - ask the police what happens to the textiles. If they are destroyed set up lobbying via your branch organisation to encourage the police to donate/auction unclaimed lost and found articles to charities/ collection organisations instead
- If there isn't:
 - set up a system in individual hotels for delivering textile items to the nearest textile container, but go through pockets first to ensure that there are no sensitive items
 - alternatively ask collectors whether they are willing to collect lost and found clothing from the hotel. These are likely to have a high reuse value.



Sammendrag

Om projektet

Københavns Kommune tager part i EU's "Urban Waste" projekt, som bestræber sig på at udvikle affaldsforebyggelse- og affaldshåndteringsstrategier i europæiske byer med meget turisme. PlanMiljø blev udpeget af kommunen til at kortlægge indkøb, forbrug og håndtering af tekstiler på hoteller i København samt potentialet for at øge den cirkulær økonomi i tekstiler. Undersøgelsen har primært anvendt data indsamlet direkte fra hoteller, indsamlere af brugte tekstiler og leasingvirksomheder. 61% af alle hoteller i København har leveret data og information.

Indkøb af tekstiler

Det estimeres, at der årligt indkøbes cirka 121 tons (3,5kg/hotelseng) af ny sengelinned, køkkentekstiler og arbejdstøj til at servicere Københavns hoteller og der er 479 tons (14 kg/hotelseng) i cirkulation. Mere end 90% (målt i vægt) af hoteltekstilerne leases. Alt sengelinned og alle gæstehåndklæder leases mens lige under en halvdel af hoteller ejer arbejdstøj til nogle af deres receptions-, bar-, husholdnings- og køkkenansatte.

Cirkulære hoteltekstiler

At øge cirkulariteten af hoteltekstiler indebærer 1) at forlænge tekstilernes brugsfase så lang tid som muligt, gennem holdbart design, reparationer og recirkulering internt på hotellerne, og 2) at sikre at kasserede tekstiler, og de materialer de indeholder, bliver genbrugt og/eller genanvendt andre steder.

På trods af at majoriteten af hoteltekstiler leases, kan både hoteller og leasingvirksomheder påtage sig ansvaret for at sikre cirkulære tekstiler. Leasingvirksomheder kan tilbyde mere holdbare tekstiler og sikre, at tekstiler recirkuleres til genbrug eller genanvendelse, når hotellerne ikke længere vil bruge dem. Hoteller kan i leasingkontrakter stille krav om, at leasingvirksomheder følger cirkulære principper. De kan ligeført sørge for at de arbejdsumiformer, de selv ejer, er holdbare og bliver genbrugt/genanvendt efter de ikke mere kan bruges på hotellet.

Nuværende status på cirkularitet

For størstedelen af hotellerne gælder, at det er leasingvirksomhederne, der driver den cirkulære trekstiløkonomi. Selvom mange hoteller har en miljøstrategi og efterspørger miljømærkede tekstiler og vaskerier, er der langt færre der overvejer cirkulære principper, når de køber, håndterer og kasserer tekstiler, eller når de udformer udbud til leasingservices.

Leasingvirksomheder promoverer aktivt mere holdbare tekstiler til hoteller og forsøger at finde genanvendelse- og upcyclingsmuligheder for bortskaffede tekstiler. Holdbarhed er en kritisk del af leasingvirksomhedernes forretningsmodel, hvorimod, i særlig luksushoteller prioriterer komfort. Det kan undertiden indebære, at de vælger mindre holdbare fibretyper, som eksempelvis 100% bomuld og bruger broderede logoer.

Der er dog en hotelkæde, som fokuserer på holdbarheden på arbejdsumiformer, ligesom de anvender gråt frem for hvidt sengelinned for at reducere risikoen for pletter, hvorved de forlænger tekstilernes



levetid. En anden hotelkæde gennemfører *in-house* reparationer. Derudover beholder og recirkulerer 71% af hotellerne deres brugte uniformer og arbejdstøj ved personaleudskiftning.

Kun 44% af hotellerne rapporterer dog, at de donerer deres kasserede tekstiler, til organisationer, der indsamler brugt tekstiler med henblik på genbrug eller genanvendelse. Det skyldes delvist mangel på en central politik samt mangel på tid og kapacitet blandt personalet til at bringe de bortskaffede tekstiler til en töjcontainer.

Alle aktører – hoteller, leasingvirksomheder og indsamlere af brugte tekstiler – er udfordret af begrænsede markeder for genbrug og genanvendelse af hoteltekstiler og arbejdstøj. De følgende løsninger er blevet identificeret:

- Genanvendelse af sengelinned og andre tekstiler med minimum 50% bomuld til industriklude
- Genbrug af arbejdsuniformer i virksomheder/organisationer i det Subsahariske Afrika
- Direkte donation af sengelinned og håndklæder for genanvendelse i herberg for hjemløse
- Upcycling af bortskaffede gæstehåndklæder til rengøring eller køkkentekstiler
- Upcycling af dug til køkkenuniformer.

Disse markeder er udfordret af lave priser for genanvendte materialer, høje arbejdsløn, logoer, der ikke kan fjernes, eller uniformer med lynlåse, knapper eller fiber-blandinger.

Anbefalinger til hoteller – forlæng den første brugsfase

Generelt

- Prioriter holdbarhed. Vælg fiber og blandinger, der kan modstå slid og vask, samt vælge mørkere farver for at undgå synlige pletter
- Lad personalet gennemføre test af forskelligt arbejdstøj for at balancere holdbarhed med komfort. Involver personalet i holdbarhedsdiskussioner herunder dets økonomiske og miljømæssige fordele
- Hvis der anvendes logo på tekstiler, skal de let kunne fjernes, i tilfælde af at hotellet skal rebrandes
- Hvis der introduceres nye arbejdsuniformer, kan hotellet fortsætte med at anvende deres eksisterende uniformer, indtil de er slidt ned. Undgå et uniformdesign, der varierer for meget fra det gamle

Ejede tekstiler

- Udvikle kriterier for slidtage, som vaskeri- og rengøringspersonale kan applicere for at afgøre, om et tekstilprodukt ikke længere kan bruges
- Etabler et take-back-, lager- og recirkuleringssystem for uniformer og arbejdstøj ved personaleudskiftning
- Etabler et reparationsværksted og træn medarbejdere i at udføre simple reparationer

Leasede tekstiler

- Identificer om en reparationsservice kan medtages i kontrakten med leasingvirksomheder
- Indsæt en klausul i leasingkontrakter om, at du som leaser kan tilbagekøbe de tekstiler, du har leaset, i tilfælde af leverandørskifte.



Anbefalinger til hoteller – opnå værdi fra kasserede tekstiler

Generelt

- Indkøb eller leas tekstiler, der indeholder genanvendte fibre (men ikke hvis det går uover holdbarhed)
- Diskuter mulighederne for at upcycle kasserede tekstiler, til nye tekstilprodukter på eget hotel (eksempelvis duse til arbejdsuniformer, gæstehåndklæder til rengøringstekstiler etc.) med leasingvirksomheder og indsamlere af brugte tekstiler
- Undgå logoer som er trykt eller broderet på tekstiler. Anvend logoer, der er nemme at fjerne
- Anvend tekstiler som er baseret på en enkel fibertype (men ikke hvis det går uover holdbarhed)
- Undgå unødvendige lynlåse, knapper og andre detaljer. Anvend et neutralt design hvor det er muligt

Ejede tekstiler

- Alloker ansvar for at sikre, at ejede tekstiler, der ikke længere kan anvendes, indsammles centralt
- Nogle leverandører af arbejdstøj er begyndte at tilbyde take-back- og genanvendelsessystemer for deres arbejdstøj. Undersøg om din leverandør tilbyder dette, hvis ikke, opfordre til det
- Diskuter mulighederne for intern indsamling med organisationer, der indsamlar brugte tekstiler

Leasede tekstiler

- Overvej at sætte krav for genbrug og genanvendelse af leasede tekstiler, som ikke længere kan anvendes, i leasingkontrakten. Anvend markedsdialog for at sikre, at dette krav er realistisk og målbart.

Tekstiler efterladt af hotelgæster

Det estimeres, at gæster årligt efterlader 10 tons tekstiler på Københavns hoteller. De fleste hoteller enten donerer disse tekstiler til tekstilindsamlingscontainere eller afleverer dem hos politiets hittegods, som der kræves af dansk lovgivning. Københavns politi rapporterer, at de sender alle de tekstiler, der leveres til dem, til forbrænding grundet manglende kapacitet til at gennemgå lommer for genstande med sensitiv personlig information.

Anbefalinger til hoteller – efterladte tekstiler

- Undersøg om, der er national lovgivning, der kræver, at efterladte tekstiler indleveres til politiet.
- Hvis det er tilfældet:
 - Etabler system og ansvar på de individuelle hoteller for at sikre, at glemte tekstiler indleveres
 - Spørg politiet, hvad der sker med de indleverede tekstiler. Hvis de destrueres få din brancheorganisation til at lobby for, at politiet donerer de indleverede tekstiler til indsamlingsorganisationer.
- Hvis det ikke er tilfældet
 - Etabler et system for indlevering af tekstiler til den nærmeste container på hvert hotel, men gennemsø lommerne for sensitive genstande
 - Spørg alternativt indsamlere om de er villige til at indsamle glemte tekstilerne på hotellet. Glemte tekstiler har en relativ høj værdi.



Background and objectives

The City of Copenhagen is a partner in EU's Urban Waste project¹, which aims to develop eco-innovative and gender-sensitive waste prevention and management strategies in European cities with high levels of tourism. Copenhagen is one of 11 pilot cities and regions within the project.

One of the focus areas selected for Copenhagen are textiles associated with tourism in the city. PlanMiljø was commissioned to carry out a mapping and analysis of textile use and management in the city's hotels from a circular economy perspective.

The overall objectives of the project were firstly, to identify the current status on how hotels gain access to, and manage their textiles, and secondly, to identify the potential for more circular thinking in hotel textiles. The results should be inspirational for the hotel sector both in Copenhagen and in other European cities. The study also considers textiles, which are forgotten by guests in hotels.

More specifically, the study considers the following questions:

1. What quantity of textiles does the hotel sector in Copenhagen use each year, and what quantity is left behind by tourists?
2. Which types of textiles do hotels lease and which type do they purchase and own themselves?
3. Under what circumstances are hotel textiles discarded and what happens to them subsequently (and to textiles left behind by guests)?
4. Who is responsible for the management of hotel textiles when they are no longer in service?
5. What possibilities are there for more circular management of hotel textiles?

¹ <http://www.urban-waste.eu/>



Scope and Methodology

Learnings from previous studies

In 2018 the Danish EPA published a comprehensive mapping² of new and used textiles flows in Denmark which included textiles consumed by various business sectors as well as government and private households. The hotel sector was briefly mapped through contact with some of the larger hotel chains and analysis of industry purchase data. The 2018 study found that approximately 840 tons of textiles were purchased by Danish hotels and restaurants in Denmark in 2016 out of approximately 5000 tonnes of textiles purchased each year by the entire Danish business sector. All the interviewed hotel chains were found to lease their household textiles (i.e. sheets, duvet covers, pillow cases, towels) but owned some uniforms/workwear. One hotel chain had a general policy on the management of discarded textiles, but the responsibility for handling used textiles was left to individual hotel managers or staff.

The survey was only a very small part of a much larger study and the results were based only on some limited replies from large hotel chains. The smaller individually owned hotels may have a very different approach to accessing and handling textiles than the large chains, but may constitute a significant share of hotels within an individual city (such as Copenhagen). It is essential that this more comprehensive study should include the full scope of hotel types.

Scope

The scope of this study comprises:

- Hotels, inns and conference centres within the City of Copenhagen. AirBnB, bed and breakfast and similar are **not** included.
- Textiles that are typically used by these hotels and conference facilities and associated kitchens and restaurants. Textiles excluded from the study are those that are a minor part (by weight) of other products e.g. carpets and furniture with textile content.
- The measurement unit of the mapping part of the study is weight. The value of purchased textiles and leasing contracts have not been mapped.

Method

Apart from the study commissioned by the Danish EPA as mentioned earlier, little data exists on the consumption and management of textiles by hotels in Denmark or Copenhagen. Data is available

² Watson et al (2018) <https://mst.dk/service/publikationer/publikationsarkiv/2018/aug/mapping-of-textile-flows-in-denmark/>



from Statistics Denmark on numbers of hotels and beds³, overnight stays⁴ and hotel employees in hotels⁵ in Denmark and in the City of Copenhagen. Otherwise the study relied on primary data and information gathered via surveys and interviews with the following groups:

- individual hotels and hotel chains;
- leasing and textile service companies; and
- collectors, reusers and recyclers of used textiles active in Copenhagen.

Questionnaire survey of hotels

An online questionnaire was developed and adjusted following a trial run with one hotel chain. The final survey included 33 questions within four main areas:

- **General questions** on the size of the hotel and number of beds and overnight visits
- **Leased textiles**: questions on which types of textiles are leased, what environmental demands are included in contracts, and under what circumstances leased textiles are discarded
- **Purchased textiles**; questions on which types of textiles are owned, purchases per year, under what circumstances textiles are discarded, and what happens to them when they're discarded
- **Lost and found textiles**: questions on quantities of textiles left behind each year by guests and how these are handled

The questions were a mix of multiple choice and open answers. An English translation of the full questionnaire can be found in Annex 1. Two questions were later added and sent to hotels via email. These are also included in Annex 1.

Hotels in Copenhagen were identified via internet survey using hotel booking sites such as Booking.com. E-mails were obtained for hotel managers (single smaller hotels) or purchasing managers (larger hotels and chains) via internet searches and telephone calls.

A link to the questionnaire was sent to all the hotels and hotel chains for which a relevant mail address had been found, along with an introductory mail describing the objectives of the project. The hotels were assured anonymity in their answers. The mail was sent to a total of 67 hotels and hotel chains. The mail was followed up by reminder mails. Where a hotel manager had only partially answered they were encouraged to complete the questionnaire through telephone calls. Unclear answers were also followed up by further questions. 23 complete responses were received covering 59 hotels.

³ Statistics Denmark dataset HOTEL3 www.statbank.dk/HOTEL3 provides data on numbers of hotels and beds within the whole of Denmark and different regions/municipalities including the City of Copenhagen (only hotels with minimum 40 beds are included)

⁴ Statistics Denmark dataset HOTEL1 www.statbank.dk/HOTEL1 provides data on overnights in hotels within the whole of Denmark and different regions/municipalities including the City of Copenhagen (only hotels with minimum 40 beds are included)

⁵ Statistics Denmark dataset ERHV1 <https://www.statbank.dk/ERHV1> provides data for employee numbers within a wide range of industries differentiated according to 6-digit Danish DB07 industry classification system, where hotels have their own code: 551010 Hotels



Survey of leasing companies

The surveyed hotels were served by just three leasing companies. All three were sent questions on quantities of textiles that they purchase to cover their leasing contracts with hotels (per bed and per employee where possible), how they determine when hotel textiles need to be discarded and what happens to discarded textiles. The questions can be found in Annex 2. Mails were followed up with telephone interviews. Two leasing companies – one large and one small - responded and were interviewed.

Surveys of collectors

A number of questions were sent to nine organisations collecting used textiles in Copenhagen. These included charitable organisations and private companies collecting both for reuse and recycling on global markets. The questions concerned: whether they receive textiles from hotels; the potential of these textiles for reuse and recycling; what could be done by hotels and leasing companies to increase this potential, and; under what circumstances the collectors would be open to stronger collaborations with individual hotels and hotel chains. The questions can be found in Annex 3. Six collectors provided full responses to the questions.

Quantitative analysis

The data received via the online survey combined with data obtained from Statistics Denmark and leasing companies were analysed to give the following quantitative results:

1. Numbers of beds, overnight stays and employees in different categories (housekeeping, reception/bar/management, kitchen) covered by responses
2. Overall share of Copenhagen's hotels, hotel beds and overnight stays that are covered by the survey responses
3. Share of hotels (weighted by numbers of beds) that lease all their textiles, the share that own all their own textiles and the share that have a mix of the two
4. Quantities of textiles purchased annually per bed (housekeeping textiles and kitchen textiles) and per employee (uniforms/workwear)
5. Estimates of total textiles purchased each year in all Copenhagen's hotels
6. Quantities of textiles forgotten by guests per overnight stay: based on weighted averages of reporting hotels
7. Total quantity of textiles forgotten by hotel guests annually in Copenhagen.

With respect to points 4 – 7 above, to make it simpler for hotels and leasing companies to answer, questions on quantities were asked in the survey to report on the **numbers** of different items that they purchase each year and not their weights. For examples, they reported on sets of uniforms/workwear, sets of bedlinen and sets of towels.

These were converted to weights using conversion rates developed during a parallel project⁶ for the Municipality of Copenhagen. Under that project different types of workwear, uniforms and linen were weighed and average per item weights calculated. A preferred method would have been to

⁶ "Kortlægning af Københavns Kommunes tekstilforbrug", mapping made by PlanMiljø for Copenhagen Municipality, 2019



weigh hotel textiles to obtain an average for these, but the budget of the current project did not allow this.

Similarly, following discussions with the test hotel, hotels were asked to report on textiles forgotten by guests in terms of numbers of regular waste bags, since it was determined that they would have no idea of the weights of these textiles. A conversion factor of 10 kg for the average weight of a waste bag of textiles was obtained from a textile collection organisation active in Copenhagen.

Qualitative analysis

As already described, the surveys of hotels, leasing companies and collectors included a range of qualitative questions on what happens to discarded textiles, who has responsibility for this, whether hotels and leasing companies have central policies for more circular textiles and how these are applied.

Hotels and hotel chains that appeared from their survey answers to have a more advanced and well-developed approach to circularity in textiles, were invited for a telephone interview. The interviews covered deeper questions on the hotels approach and their thoughts on a range of potential initiatives for improving circularity of textiles, including durability, reusability and recyclability considerations, plus circularity requirements in their leasing contracts. Representatives from three hotel chains were interviewed.

All this information was analysed to gain a view on the current status of circularity and the potential for increased circularity. Recommendations were then developed that could release the potential for more circularity in textiles.



Results: textile use and circularity in hotels

Numbers of beds, overnights and staff

Hotels and hotel chains representing 59 hotels completed the online questionnaire. 44 (75%) of the 59 hotels are part of a chain or group, with the remaining 15 being individually owned and managed. The 59 hotels ranged considerably in size from 77 and 1 150 beds. The responding hotels represent 61% of all hotels in Copenhagen, 47% of all beds and 48% of all overnights (see Table 1).

Table 1 Share of the hotels in Copenhagen that responded to the survey

	No. of hotels	No. of beds	No. of overnights
Survey	59	16 256	3.59 million
City of Copenhagen⁷	97	34 600	7.45 million
Share	61%	47%	48%

Beds and overnights are key factors with respect to bedlinen, guest towels and so on, whereas numbers and function of staff are important with respect to types and quantities of purchased/leased uniforms. The 59 hotels in the survey employ just over 3 800 staff (see Table 1). 37%⁸ of hotels fully outsource housekeeping services, while a single hotel also outsources kitchen and technical maintenance staff. Using average number of housekeeping services, and catering services per bed, we estimate a further 500 outsourced staff working in the responding hotels.

Scaling up according to numbers of beds in Copenhagen as a whole gives just under 9 000 people working in hotels in Copenhagen (see Table 2). Reception, bar staff and management represent a little under half of the total (including outsourced). Housekeeping is the second largest group at 29%. Staff working in responding hotels are 55% female and 45% male.

Table 2: Total number of hotel staff in responding hotels

	Reception/ bar/management	Housekeeping/ cleaning	Catering	Other	Total
Employees	2 005	764	663	374	3 806 (88%)
Outsourced staff (estimated)		490	3	3	496 (12%)
Sum	2 005 (47%)	1 254 (29%)	666 (15%)	377 (8%)	4 302
(Estimated total in Copenhagen's hotels)	4 180	2 610	1 390	785	8 960

⁷ Statistics Denmark, 2018 numbers. www.statbank.dk/HOTEL3 and www.statbank.dk/HOTEL1. Only hotels with a minimum of 40 beds are included in this datasets

⁸ Weighted according to number of beds of hotels with and without outsourcing



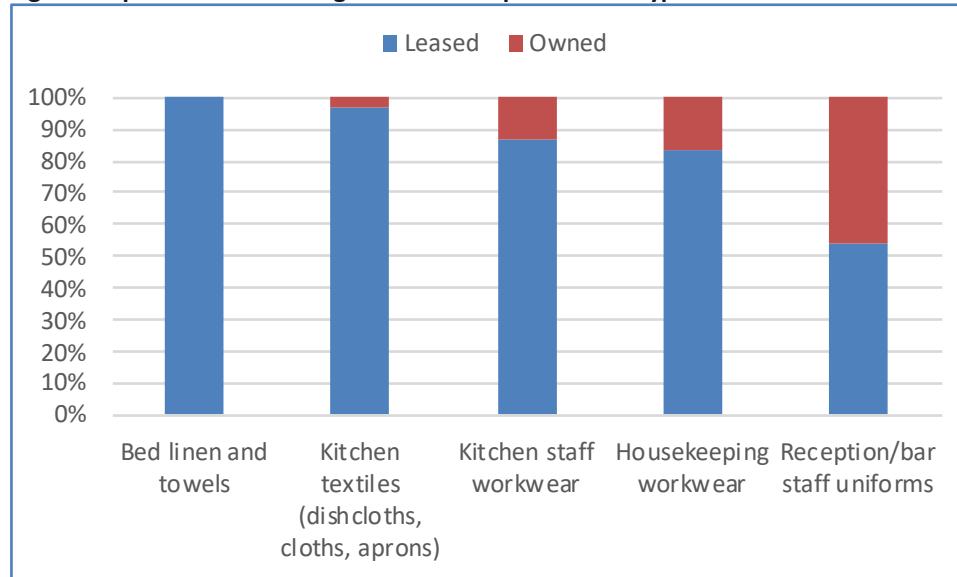
Split between ownership and leasing

Textiles consumed by hotels can be usefully classed as follows:

- Housekeeping textiles (used by guests: bed linen, towels, bath robes etc.)
- Kitchen and dining textiles (tea towels, dish cloths, aprons, serviettes, table cloths)
- Uniforms/workwear for reception, bar staff and management
- Uniforms/workwear for housekeeping (those cleaning and preparing rooms)
- Uniforms/workwear for kitchen staff (can include waiters, but these can also be included under service staff)
- Other (curtains, bed spreads)

Leasing plays a dominant role in hotels access to textiles. Housekeeping textiles are 100% leased. 54%⁹ of hotels lease all of their remaining textiles, with 46% owning some textiles. The mostly typical textiles owned by hotels are reception/bar/management staff uniforms/workwear and housekeeping workwear (see Figure 1). A handful also own kitchen staff workwear and housekeeping workwear.

Figure 1: split between leasing and ownership of various types of textiles



Note: shares are weighted according to numbers of beds in the responding hotels/hotel chains

Consumption quantities

It is worth distinguishing between the total weight of hotel textiles *in service* at any one time, and the annual *purchases* of hotel textiles.

Textiles in circulation

For every uniform worn by a member of staff, and for every sheet, duvet cover and pillow case found on a bed there will be several other sets being processed in the laundry and supply system or waiting to be used.

⁹ This is a weighted average calculated according to the numbers of beds of hotels that lease textiles compared to the total numbers of beds



According to leasing companies, there are typically 11 sets of uniforms in circulation for each member of staff with physical work (housekeeping and kitchen staff), 5-7 sets of uniforms for other types of staff (reception, bar staff, management) although there may be a lower number jackets and trousers that are changed less regularly.

There are typically 5 sets of bed linen and 5 sets of guest towels for each bed, assuming fully booked hotels. We haven't been able to gain the same type of data for other textiles such as cleaning cloths, dishcloths, aprons and other kitchen textiles.

Making use of this information, combined with typical weights of textiles as gathered from a parallel project on Copenhagen Municipality's procurement of textiles¹⁰ we estimate that that there are just under 480 tonnes of hotel textiles in circulation in Copenhagen at any one time (see Table 3). This estimate assumes that hotels that own their own textiles have the same numbers of textiles in circulation per bed and per member of staff as if they were leasing the textiles. It also only includes bedlinen, guest towels and uniforms/workwear.

Table 3: Estimated total hotel textiles in circulation in Copenhagen

	Weight for one set (kg)	Sets per unit (bed or person) ¹¹	Weight in circulation per bed/staff member (kg)	Total weight in Copenhagen (tonnes)
Bed linen (one duvet cover, one sheet, two pillow cases)	1.2	5	5.9	202
Guest towels (one bath towel, one hand towel, one bath mat)	1.0	5	5.0	173
Uniforms for housekeeping (one pair of trousers, one T-shirt/blouse)	1.2	11	13.1	35
Uniforms for kitchen (one pair of trousers, one shirt/blouse, one apron)	1.2	11	13.1	19
Uniforms for reception/bar staff/management plus other staff (one jacket, one pair of trousers, one shirt/blouse)	1.6	6	9.8	50
SUM*	-	-	-	479

*note that we have not included other textiles such as dish cloths, tea towels, tablecloths and other textiles which are not directly associated with staff or beds

Annual purchases of new textiles

The quantities of purchases of new textiles should be largely independent of the number of textiles in circulation for each bed or member of staff, but directly linked to the total numbers of staff members and beds. For example, if one hotel only had two sets of bedlinen in circulation per bed, each individual item would become worn out 5 times faster than a hotel that has 10 sets of bedlinen in circulation per bed. The annual purchases of bedlinen would be the same for both hotels, regardless of the number of textiles in circulation.

The exception to this rule is when there are other factors leading to the discarding of textiles. For example, still functional uniforms may be discarded due to a change in the workwear/uniform style or in the logo/brand of a hotel, or if a leasing contract comes to an end. These events are discussed later.

¹⁰ Kortlægning af Københavns Kommunes tekstilforbrug”, mapping made by PlanMiljø for Copenhagen Municipality, 2019

¹¹ This information has been provided by DFD.



We have two types of information on which to make estimates of annual purchases: 1) direct reporting by hotels on numbers of purchases, and 2) average expected lifetimes of different textile types from leasing companies. Since no responding hotels own their own bedlinen or guest towels they have only reported on purchases of uniforms and a few other textile types.

Leasing companies can provide information on expected lifetimes of textiles in circulation but were not able to provide us with data on annual purchases.

Table 4 presents our estimates of purchased hotel textiles in Copenhagen each year. The range in numbers of uniforms reported to be purchased by hotels per member of (relevant) staff was too high to be useful (greyed out column). All estimates in total consumption have therefore been based on the technical life expectancy of textiles and are therefore. These figures are probably conservative since in reality there will be circumstances where textiles don't reach the end of their technical life; for example, due to coffee stains and other unexpected damage or theft.

The annual consumption of textiles for use in Copenhagen's hotels is very conservatively estimated at just over 120 tonnes. This comprises bedlinen (52 tonnes), guest towels (43 tonnes) and uniforms (26 tonnes). We were not able to estimate purchases of other types of textiles including kitchen and dining textiles (tea towels, dishcloths, napkins, tablecloths), curtains, blankets and dressing gowns. Assuming that the textiles are dominated by cotton and polyester, **the production of hotel textiles for Copenhagen leads to approximately 3000 tonnes of CO2-equiv. emissions per year¹².**

Table 4: Estimated annual purchases of hotel textiles in Copenhagen

	Number in circulation per bed/staff	Reported average life expectancy (months)	Estimated annual purchase (sets per bed/staff)	Reported annual purchase (sets per bed/staff)	Number of beds/staff in Copenhagen	Weight per set (kg)	Annual consumption in Copenhagen (tonnes)
<i>Bed linen</i>	5	48	1.25 (per bed)	-	34 600 (beds)	1.2	52
<i>Guest towels</i>	5	48	1.25 (per bed)	-	34 600 (beds)	1.0	43
<i>Uniforms for housekeeping staff</i>	11	48	2.75 (per staff)	0,4 - 0,9	2 650 (staff)	1.2	9
<i>Uniforms for kitchen staff</i>	11	48	2.75 (per staff)	0,3 - 0,9	1 400 (staff)	1.2	5
<i>Uniforms for reception/bar staff/management + other</i>	6	48	1.5 (per staff)	0,3 - 3,3	5 050 (staff.)	1.6	12
SUM	-	-	-	-	-	-	121

Combining these figures with those in Figure 1 gives the result that approximately **6 % of consumed textiles are purchased and owned by the hotels, with the remaining 94 % owned by leasing companies**. Efforts to improve circularity on textiles should be focussed on leasing companies. Hotels can exert a strong influence on the textiles supplied by leasing companies and how they are treated end-of-life, via leasing contracts. These issues are considered in the following chapter.

¹² Using average of CO2 produced in production of cotton and polyester fabrics at 25 kg CO2 equiv per kg. See Figure 30 in JRC (2014)

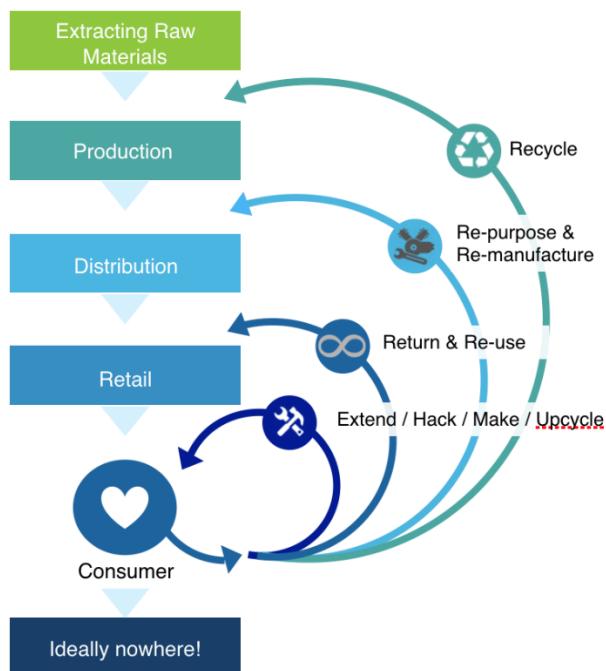


The circular economy and textiles

The need for a more circular economy has rapidly risen up the environmental (and economic) political agenda over the past decade. *Closing the Loop*¹³ - the European Commission's 2015 Action Plan for a Circular Economy - and resulting amendments to the EU Waste Framework Directive demand circular economy thinking in both government and in industry in Europe.

The basic concept of the circular economy is to maintain the value of products and materials for as long as possible. The active lifetime of products can be extended through using durable textiles, establishing repair and maintenance systems, and systems for recirculating discarded functional products to new users. When a product is no longer functional, the materials it contains should be recycled for use in new products to create further value.

Figure 2: overview of the technical circular economy for a generalised product



Source: IBM¹⁴ based on Ellen Macarthur

As such the circular economy has the waste hierarchy at its core, with reuse prioritised before recycling, but it adds in the all-important economic dimension: that the reuse, repair, remanufacture and recycling of products can bring major economic benefits and contribute to innovation, growth and job creation.

¹³ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015DC0614>

¹⁴ https://www.ibm.com/blogs/insights-on-business/consumer-products/like-a-circle-in-a-spiral/circular_eh/



Hotel policy on circularity in textiles

General questions on the existence of environmental/CSR policy in hotels and hotel chains or environmental policy related to textiles were not included in the online survey. All three of the hotel chains that were interviewed have sustainability policies which include elements which either specifically name textiles or include more generalised circular economy policy with relevance to textiles.

The policy aimed specifically at textiles mostly concerns purchasing (or leasing of) eco-labelled products. Ecolabel criteria do have some relevance for circularity, since some include some (relatively non-stringent) durability and quality criteria, and the majority include restrictions on chemical content that can partially increase their recyclability for use in new textiles.

	Hotel chain 1	Hotel chain 2	Hotel chain 3
Documents	An Environmental Policy + Sustainable Procurement Guide	Sustainable Management Plan + Purchasing Policy	Sustainability Policy
Specific policy on textiles	Preference for procurement of Cradle to Cradle certified (silver, gold, platinum-level) Nordic Swan, EU Ecolabel, Bra Miljöval, GOTS or other certified organic textiles	All products purchased by or produced for the chain, including linen, towels and other textiles come from organic and/or fair-trade suppliers. Bed linen, duvets and towels that are too worn out for hotel use but still usable, are sewn into pillow covers or donated to charity Towel and linen reuse programmes	None
Other relevant circularity policy	Materials – the materials used in products should be environmentally sustainable from a life cycle, perspective with a preference for products with renewable raw materials and/or recycled materials. Waste – strive to recycle and reuse products and materials to the greatest extent possible. The waste arising from hotels operations should be sent to recycling or modern waste management facilities Ecodesign - preference for products that are easy to assemble and disassemble for ease of repair and recycling. Avoidance of material blends that cannot be disassembled.	Use of reusable, returnable and recycled goods where possible	2021 goal for 99% recycling of all waste. Introduction of circular thinking at all levels to increase the possibilities for recycling. Preference for recyclable products in purchase policy.



The more general circularity policy is very relevant, and includes goals for purchasing reusable, reparable, recyclable (including products with ease of disassembly) products, and products which include recycled content.

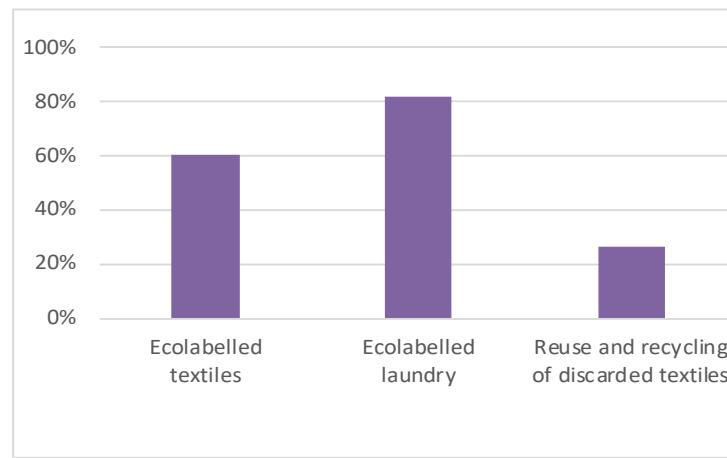
It isn't certain though that the hotels have applied this policy to textiles, or even noted that the policy is relevant to textiles. The fact that most textiles are leased rather than owned may blinker hotel managers eyes. For example, the third hotel chain's recycling policy only applies to waste generated within hotels, not to waste generated by suppliers of services.

The second hotel chain does include policy on reuse and upcycling of the textiles that the hotel leases. However, the quoted policy is actually that of the leasing company and little effort has been made to enforce this policy through specifications in leasing contracts.

These three chains are amongst the frontrunners with regard to circular textile initiatives. The responses to the online survey below for the broader spectrum of hotels, demonstrate that demand for eco-labelled textiles and laundry services is relatively widespread but that there is significantly less official policy concerning circularity in textiles (see Figure 3).

27% of hotels claimed to include requirements on leasing companies to ensure a reuse and recirculation of their discarded textiles. When questioned more closely, however, these turned out not to be requirements but discussions with leasing companies and an awareness that they were striving for more reuse and recycling.

Figure 3: share of hotels that include environmental requirements in leasing contracts



Note: shares are weighted according to numbers of beds in the responding hotels/hotel chains

When asked why they did not include reuse and recycling requirements in leasing agreements, the vast majority replied that they were not aware of this as a possibility, while a few noted the difficulties of administrating such a requirement. The two largest leasing companies operating in Copenhagen, themselves have strong circular economy policy on their textiles and thus many hotels don't feel the need to push the leasing companies further in this direction.

Circular initiatives do exist for hotel textiles as described in the next sections, but are often ad hoc rather than managed centrally and are often implemented for economic and not environmental reasons.



Maximising the first use phase

Contributing factors

By the ‘first use phase’ we mean the time that the product is in active service in the hotel or the leasing company that owns it. Greatest environmental benefits can be gained from extending this phase as far as possible. This can be achieved via a range of actions:

- **Maximising the technical durability** of the product (how many use and wash phases it can withstand)
- **Repair operations** in hotels and leasing companies
- Use of **standard criteria for wear and tear** when a product is no longer fit for service, and **ensuring consistent use of these criteria**
- **Avoiding discard of functional textiles** when a hotel changes style or logo
- **Recirculation activities** within the hotel or hotel chain
- **Avoiding loss of textiles in system** (through theft or other means).

The next few sub-sections assess the extent to which these actions are already implemented in hotels and gives recommendations on how the situation can be improved.

Maximising technical durability

According to leasing companies, technical durability is one of the key factors for consideration when selecting fibre type and (to a lesser extent) colour of textile products.

Since hotel textiles are for the most part used until they reach their technical limit (see below), there are large economic incentives to choosing textiles with high durability provided that a *total cost of ownership* (TCO) approach is used for budgeting. A TCO approach is fully integrated into leasing companies’ economic models, but less so for hotels. Leasing companies typically carry out laundry tests of textiles before purchasing them to test for durability, colour change etc.

Comfort is also a key criteria, and this can in some cases be in conflict with technical durability. Polycotton fabrics tend to be more durable than pure cotton. However, leasing companies report that some of the high-end luxury hotels opt for 100% cotton due to a wish to enhance exclusivity, despite dialogue with the leasing company on environmental considerations.

Comfort along with price are the key factors considered by hotels when selecting hotel textiles and work wear. Durability is only considered if this doesn’t undermine comfort. A few hotels said that they carry out user testing of uniforms with staff to determine comfort. Others stated that they rely wholly on recommendations from leasing companies. One large chain puts significant focus on durability for uniforms, partially at the request of its staff. It also uses grey rather than white bedlinen to reduce the risk of stains.

Two of the interviewed hotel chains have recently been offered a new bedlinen product by their leasing company which increases durability while not affecting comfort. In this new product, the core of cotton threads in the weave are replaced with recycled nylon. Because the nylon core is surrounded by cotton the feel of the bedlinen is similar to 100% cotton bedlinen although the actual share is 60/40 cotton/nylon. The product has a reportedly 50% higher durability. The recyclability is negatively affected but this is far less important from an environmental (and economic) perspective than the increased durability.



Repair

Repair is another means for extending the use phase. One of the three interviewed hotel chains reported that repair of uniforms is a regular practice and repair facilities are available in all their hotels in order to save money. Repair is not common practice in leasing companies.

Criteria for wear and tear

Leasing companies and some of the hotel chains use standard criteria for assessing wear and tear, which are utilised in the laundries and/or in housekeeping. These concern loss in weight, presence of holes and miscolouring. For individually owned hotels it is typically left to the judgement of the responsible staff member on whether a textile is fit for use or not.

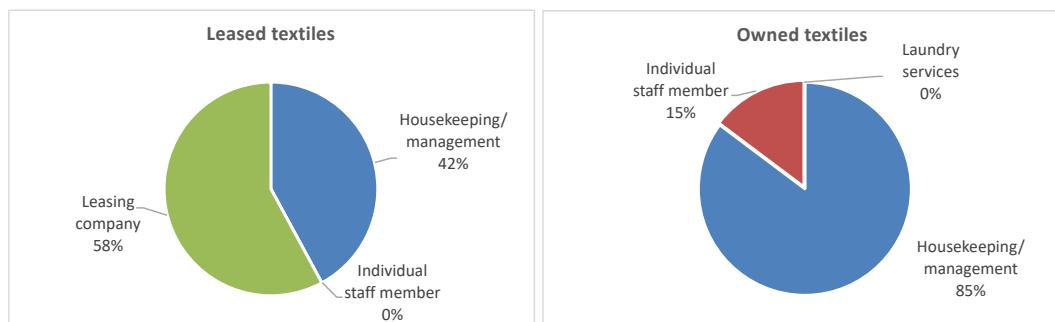
Leasing companies report that while some hotels leave wear and tear thresholds to them, others are very specific. High-end hotels can be particularly strict and the textiles that they consider not fit for reuse can be fit for service in middle-range hotels. As an example, *luxury* towels can only tolerate 10% weight-loss before they miss their luxury status. The rejected towels are then typically passed on for use by mid-range hotels for which they are more than adequate in terms of quality, measured in GSM (grammes per sq. metre).

One smaller leasing company reported having sensors on its drying/folding belts that scans for miscolouring and for holes and other wear and tear. Rejected textiles are further checked by laundry staff. The automatic scanner is not 100% reliable and manual checks are also needed every so often.

According to questionnaire responses, responsibility for deciding on whether a textile is no longer fit for service is distributed between various actors (see Figure 4).

In many cases textiles will be screened for wear and tear by more than one actor. As one hotel explained that, although it is primarily their leasing supplier's responsibility to screen textiles for damage/wear before returning textiles to the hotel, the hotel's housekeeping carries out parallel checks due to the high negative impact that worn-out textiles have on customer satisfaction.

Figure 4: delegated responsibility for decisions on whether textiles are fit for service



Note: shares are calculated according to numbers of beds in answering hotels/hotel chains

Avoiding discard of well-functioning textiles

Functional textiles can sometimes be discarded if a hotel changes style or logo. This is most likely to affect uniforms/workwear but could conceivably also affect bedlinen and guest towels if these are printed or embroidered with logos or brand colours.

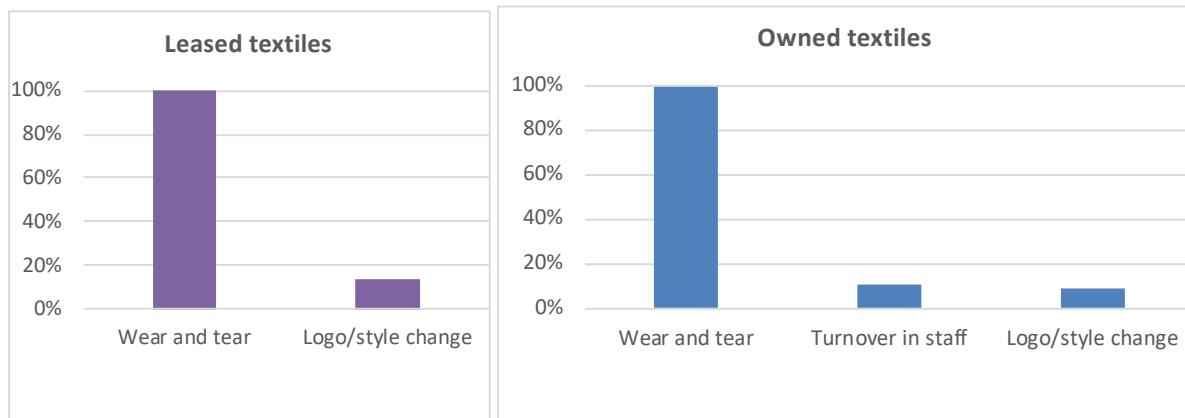


According to both hotels and leasing companies, this situation does occur, but not regularly. Approximately 10% of hotels reported that leased or owned textiles had at some point been discarded as a result of a logo or style change (see Figure 5).

Of the 13 hotels and hotel chains that answered when they last had changed their logos, four replied that they never had, and the remaining nine had changed their logo an average of five years ago. Two of these nine had discarded textiles in association with the logo change.

One large leasing company reported that only 1-2% of the hotel textiles that they supply have logos directly printed or embroidered (high end luxury hotels) into their textiles. Otherwise logos tend to be on removable labels or straps. Where logos are embroidered these tend to be found on bath robes and sometimes towels and pillows but not on bed linen. This is discussed in more detail under markets later.

Figure 5: reasons reported by hotels for discarding textiles



Note: shares are calculated according to numbers of beds in answering hotels/hotel chains

11% of hotels¹⁵ (according to bed numbers) reported discarding otherwise functioning uniforms when a staff member stops, rather than retaining these for use by other/future hotel staff. In some cases, the staff member is allowed to take the uniforms with them for their own use e.g. trousers or shirts without logos.

Recirculation activities within a hotel

An encouraging 71%¹⁶ of hotels report that they recirculate functioning uniforms that are no longer in use by the original staff member (due to changes in employment). Staff turnover in the branch is high¹⁷ and a takeback and recirculation system avoids a potentially significant waste in otherwise functional uniforms.

Even for hotel chains this tends to happen at individual hotel level rather than being stored and distributed throughout the chain. Due to the need to cover a range of sizes, recirculation is more optimal in larger hotels, but provided that logos and styles don't change too often and that the hotel has sufficient storage space it can also work well for smaller ones.

¹⁵ Share calculated according to shares of total beds

¹⁶ Share calculated according to shares of total beds

¹⁷ Deloitte (2016) Hospitality 2015 – Game changers or spectators



Avoiding losses of textiles

Only leasing companies were asked on the degree of leakage of textiles from their service system, due to theft by hotel guests/staff or for other reasons. One company reported a significant loss of towels and dressing gowns, especially from the more luxury hotels, but not of other textile types.

Two of the leasing companies are introducing chips in their textiles that will give them better data on the magnitude of losses. Using chips that are not visible to guests reduces the risk of appearing to mistrust them.

Recommendations for hotels - Maximising the first use

General

- Prioritise durability when selecting and designing workwear and other textiles that are purchased or leased by the hotel. Choose fibres and fibre blends that can resist wear and tear and laundry processes, darker colours to reduce effects of staining, and strength in areas where the workwear is under stress. Talk with your textile leasing company and suppliers on durability. They will have many ideas.
- Carry out tests of durable workwear with your staff to ensure comfort. Involve them in discussions of durability and its benefits for economy and environment.
- If using logos on textiles, ensure that these can be easily removed and replaced if the hotel should undergo a rebranding
- If introducing a new style of workwear, continue to use the existing supply of the phased-out style until these are completely used. Avoid using new styles that stand out too strongly from the old.
- Avoid using tablecloths where possible. This policy is increasingly being practised by high class restaurants.

Owned textiles

- Adopt a take-back, storage and recirculation system for uniforms/workwear so that when a member of staff stops, the workwear is stored and recirculated to other/new members of staff
- Develop criteria for wear and tear, that allocated members of staff in housekeeping/ laundries can use to determine when a textile product is no longer fit for service and 1) can be repaired or 2) needs to be discarded
- Provide a repair station and train member(s) of staff in simple repairs of workwear and other textiles owned by the hotel.

Leased textiles

- Identify whether a repair service can be included in your contract with leasing companies
- Include a clause in leasing contracts that you can purchase the textiles that have been in your service (and that are unique to the hotel) at the end of a contract period, in case you wish to change leasing service providers



Gaining value from discarded textiles

The previous chapter looked at efforts made by hotels and our recommendations on how to keep textiles in service as long as possible. However, at some point all textiles are no longer fit for service and are discarded. This section looks at the extent to which value is currently gained from the discarded textiles, challenges to this and how these can be overcome.

There are three key necessary elements to promoting the reuse and recycling of hotel textiles:

- ensuring **separate collection** of discarded textiles
- **finding (viable) reuse and recycling markets** for collected textiles
- **designing textiles** for ease of reuse and recycling

These are considered in the following sections.

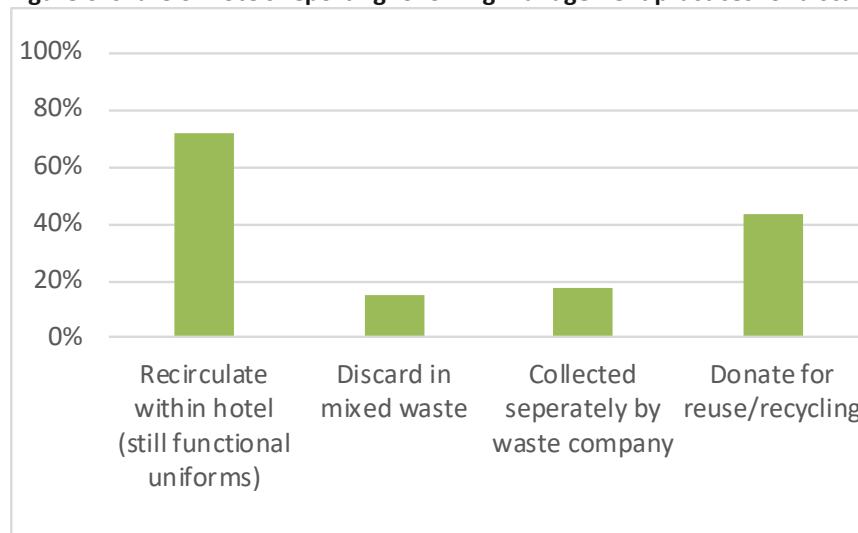
Ensuring separate collection of discarded textiles

Textiles owned by hotels

Organisations representing 27 hotels and 45% of the total number of beds covered by all survey responses, purchase and own all or some uniforms and a few other textile types. These hotels were asked to report on their management practices for discarded textiles (see Figure 6).

Only 17% claim to discard textiles in mixed waste, and all of these were individually-owned hotels. One large hotel chain, has its textiles collected separately by a private waste company. Finally, a little under half (44%) reported donating at least some of their used textiles to various organisations for recycling/reuse (see Figure 6)¹⁸.

Figure 6: share of hotels reporting following management practices for discarded textiles



Note: shares are calculated according to numbers of beds in answering hotels/hotel chains

Only one hotel chain reported having a formal cooperation with a collection organisation. Otherwise, textiles tend to be donated ad hoc via making use of nearby containers run by the various collection organisations. This

¹⁸ The results given in Figure 6 cannot be translated into the actual shares of textiles following the various fates, since individual hotels may have a number of management solutions for different types of textiles).



suggests that donations are not formalised and may be dependent on the capacity/initiative of individual staff at the time when textiles are discarded.

As an alternative solution to donations to independent collection organisations, another hotel chain reported that it runs a take-back system for its worn-out uniforms/workwear which are then returned to its Danish work wear supplier for recycling. The supplier runs a form of extended producer responsibility.

Leased textiles

Leasing is in many ways an ideal solution with respect to maximising reuse and recycling. Take-back of products that are no longer fit for service and a centralised gathering of these are inherent within leasing systems. This is particularly the case for textiles because just two companies run over 90% of all leasing services in Denmark. However, these companies have a large number of individual laundries which remain relatively independent with respect to their approaches to the management of discarded textiles.

There have been some moves towards a more centralised policy on the management of discarded textiles in these companies. The companies are individually, and via the Danish branch organisation BVT¹⁹ attempting to find reuse and recycling opportunities for discarded textiles (Watson et al, 2018).

As noted earlier, these efforts are not being made in response to a demand from hotels (or other clients) but due to internal awareness within the textile leasing industry. Only five hotels or hotel chains in the survey have discussed circularity issues with leasing companies and no examples were found of hotels that had included relevant requirements in leasing contracts. The majority of hotels were not aware that such possibilities exist.

Finding markets for collected hotel textiles

One interviewed leasing company donates all its discarded textiles to a private textile collector, who recycles bedlinen and where possible also uniforms with minimum 50% cotton content to make industry wipes. The other two leasing companies have various solutions.

One of them is to provide discarded textiles that are 100% cotton to a Danish recycling company for downcycling into laminated boards for use in furniture. A further solution has been to upcycle discarded tablecloths into workwear for kitchen staff. This has been possible because stains that render tablecloths non-usable for aesthetic reasons, do not have an effect on their functionality for kitchen staff. Other cotton-based or polycotton textiles are collected by a recycling company with facilities in Poland for processing these into industry wipes and other recycled products.

With respect to reuse, as noted earlier, it is common practice for leasing companies to recirculate textiles that no longer meet the strict requirements (i.e. minimum weight of a towel) of luxury hotels to mid-range hotels with less strict quality requirements. Otherwise no reuse opportunities were reported by the leasing companies.

One hotel chain reported that they have asked their leasing company to deliver worn out towels back to them so they can use them in kitchens and housekeeping as cleaning cloths. The leasing company was not willing to do this due to a perceived risk that the worn-out towels would be mixed up with the in-service towels.

¹⁹ Brancheforeningen for Vask og Tekstiludlejning



Unfortunately, none of the leasing companies were able to provide us with figures on the shares of their discarded hotel textiles that are recycled and the share that are sent for incineration.

Used textile collection companies were also asked to report on potential reuse and recycling markets for discarded textiles. The answers depended on the business model of the collector. The business model varied as follows:

- 2 private companies selling on global reuse and recycling markets
- 1 private company selling on reuse markets in Eastern Europe
- 1 charity selling in Danish 2nd hand shops and on global reuse and recycling markets
- 1 charity selling on global reuse and recycling markets
- 1 charity selling only on Danish markets as well as direct donations of textiles to social goals in Denmark.

None of the collectors have formal agreement with any hotels or hotel chains on receiving their discarded textiles. Two private collectors reported having such agreements with textile leasing companies. The other companies sometimes receive hotel linen and uniforms in their street-side containers and containers in municipal recycling centres.

The collectors identified the following existing or potential reuse and recycling options for these textiles:

- Reuse of uniforms in businesses and organisations in sub-Saharan Africa where there can be a reasonable demand for these, regardless of logos and design. A pre-requisite, however, is that the uniforms are in groups of six or more (to supply a minimum staff of three)
- Direct donation of bed linen and towels for reuse in homeless shelters in Denmark or for hospitals/hospices etc. in other parts of the world
- Recycling of bedlinen, dishcloths and other textiles with minimum 50% cotton including uniforms with details removed, into industry wipes
- Upcycling of discarded guest towels to cloths for cleaning or kitchen use, for resell back to hotels or other users
- Upcycling of tablecloths into kitchen uniforms.

The collectors also identified the following challenges with respect to reuse and recycling of hotel textiles:

- The economics are tight or negative for all of the solutions identified since market prices for recycling are low (though operable for cotton and to a lesser extent polycotton), and the markets for reuse of uniforms are in relatively poor countries
- Some uniforms with a very distinctive design can inhibit reuse. Blouses, shirts and trousers with more neutral designs are more readily reusable
- Logos can inhibit reuse locally, but are less of a hindrance for the receiver in developing countries. The organisation that owns the logo can be sensitive, however, to the uniform's subsequent use
- Details such as zips and buttons reduce recycling potential as these have to be removed prior to the recycling process
- Fibre blends inhibit fibre-to-fibre recycling.

In general, these challenges also affect the level of interest of collectors in setting up formal collection arrangements with hotels. Nevertheless, all but one of the collectors stated that they would be willing to establish cooperation with larger hotel chains and hotels but also potentially with smaller ones.

These would include establishing collection containers at hotels but could also include upcycling of discarded products such as towels or table-cloths into other products such as kitchen cloths and kitchen uniforms for resale back to the same hotels.



Designing textiles for ease of reuse and recycling

As described above, collectors of used textiles identified a number of challenges to finding markets for reuse and recycling. Some of these can be overcome by designing hotel textiles that are better suited to reuse and recycling markets.

The three interviewed hotel chains reported on their engagement in design for ease of reuse/recycling. None of the three have given much attention to such design.

Design for reuse: Two of the hotels have logos printed or embroidered on parts of their workwear. For one chain, it concerns embroidered logos on polo shirts used by technical staff and housekeeping. For the other, it concerns t-shirts printed with the hotel's logo. Neither hotel donates these textiles due to fear of misuse of their logos. Both are considering phasing these logos out, or making them removable to allow reuse.

Design for recycling: The same two hotel chains use eco-labelled workwear which partially increases recyclability due to lack of harmful chemicals. Moreover, duvet covers have folds rather than zips or buttons, which increases recyclability; this design has been implemented to increase efficiency of housekeeping, not to increase recyclability. In general, the hotels are using fibre blends to increase durability, which has a negative effect on recyclability. However, durability is of much higher importance than recyclability from an environmental perspective.



Recommendations for hotels - Gaining value from discarded textiles

General

- Procure or lease textiles with recycled content where this doesn't conflict with durability/comfort and thus contribute to increased demand for recycled textile fibres
- Discuss with your leasing company or with used textile collection organisations options for upcycling of your discarded textiles to new textile products for use in your hotel e.g. tablecloths to kitchen uniforms, guest towels to dishcloths or cleaning cloths etc.
- Avoid logos that are printed or embroidered on to your textiles. Use easily removable logos or badges
- Use textiles that are based on single fibres types but only if this doesn't compromise durability
- Avoid unnecessary zips, buttons and other details on textiles. Use neutral designs where possible to enhance re-usability when discarding

Owned textiles

- Adopt systems and allocate responsibility to ensure that all owned textiles no longer fit for service are centrally collected with a view to reuse/recycling
- Some workwear suppliers have begun operating take-back and recycling systems for their workwear. See if your supplier offers this. If not encourage them to do so.
- Discuss with used textile collection organisations, possibilities for in-house collection via a container on hotel grounds
- If using logos on textiles, ensure that these can be easily removed and replaced (for example name badges with logos on reception and housekeeping staff) if the hotel should undergo a rebranding
- If you are forced to discard sets of functional uniforms/workwear due to a style/supplier /brand change then donate these to charities with links in Africa where there is demand for 2nd hand uniforms/workwear in companies and other organisations

Leased textiles

- Consider placing requirements for reuse and recycling of leased textiles that are no longer fit for service in leasing contracts. Use market dialogue to ensure that these are realistic, measurable and can be documented



Treatment of textiles in lost property

21 hotels and hotel chains representing 52 hotels with 14 163 beds, reported on quantities of clothing and other textiles left behind by guests each year. They were asked to report in terms of numbers of ordinary waste bags within intervals (see Figure 7a) to make it easier for them to visualise and answer.

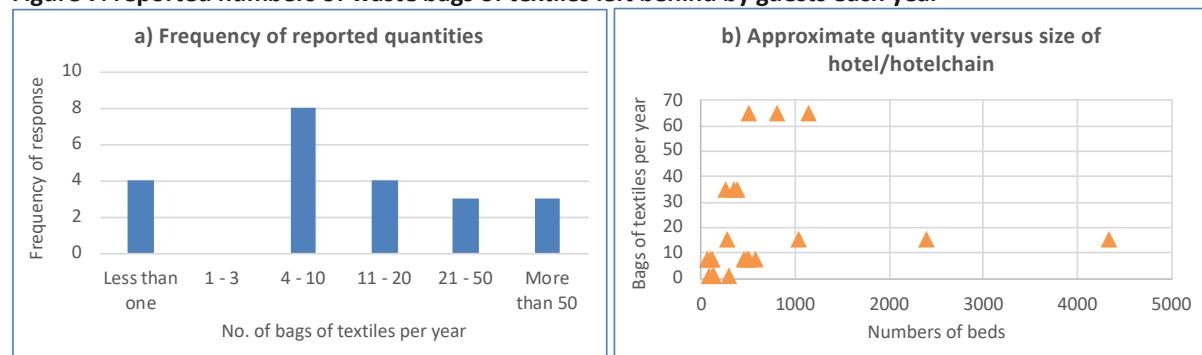
The reported amounts vary considerably and not only in line with the numbers of beds in a given hotel. Some hotels reported relatively small quantities despite large numbers of beds and vice versa (see Figure 7b).

Assuming that quantities in each case lie in the middle of each class interval and that an average bag of used textiles weighs 10 kg²⁰, we estimate that each guest leaves behind on average 1.3 grams of clothing behind. This doesn't sound like much but it means that **guests leave behind just over 10 tonnes of clothing and other textiles in Copenhagen's hotels each year**.

Hotels report one of three strategies for dealing with forgotten guest clothing. All reported storing the items for a period varying between 6 weeks and 6 months to allow guests to reclaim them. Afterwards, the textiles are either delivered to the police's Lost and Found department (8 hotel chains and individual hotels), donated to used textile collection (9 hotel chains/hotels) or discarded in ordinary waste (4 individual hotels).

All the hotel chains are among the first two groups. The few individual hotels that discard the textiles in ordinary waste report that they do this due to lack of staff capacity to deliver elsewhere.

Figure 7: reported numbers of waste bags of textiles left behind by guests each year



Note: the average quantities in b) are assumed to sit at the middle of the class interval. A conservative 65 bags has been assumed for the 'More than 50' interval

We contacted the police lost and found department who reported, firstly, that under Danish law²¹ all hotels should deliver lost and found guest items to them and not for donation, and secondly, that all the unclaimed clothing and textiles delivered to them are stored for a month and then sent for incineration.

This means that under current circumstances more than half of all forgotten guest textiles are incinerated, despite the good intentions of the majority of hotels.

²⁰ Collectors report that a bag of textiles weighs between 5kg (stuffed plastic shopping bag) and 15kg (larger waste bag)

²¹ Lovbekendtgørelse nr. 733 af juli 2009 <https://www.retsinformation.dk/forms/r0710.aspx?id=145199>



Copenhagen's police reported that earlier they donated unclaimed clothing to charitable organisations, but that they no longer afford the time needed to go through pockets of trousers, jackets to check for personal possessions that might include sensitive data.

One solution to this may be that Copenhagen Police issues a tender process for the collection of unclaimed textiles from Lost and Found for a per kg price that would allow them to check for personal possessions prior to delivering the textiles. Alternatively, the contract with a collector could include clauses that they should check all pockets for sensitive items and deliver such items back to the police.

Recommendations for hotels - Textiles forgotten by guests

- Check whether there is a national law stating that you must deliver all unclaimed lost and found items to the police, as there is in Denmark.
- If there is:
 - set up a system of responsibility in individual hotels to ensure this happens
 - ask the police what happens to the textiles. If they are destroyed rather than donated, set up lobbying via your branch organisation to encourage the police to donate/auction unclaimed lost and found articles to charities/collection organisations instead
- If there isn't:
 - Set up a system in individual hotels for delivering textile items to the nearest textile container, but go through pockets first to ensure that there are no sensitive items
 - Alternatively ask collectors whether they are willing to collect lost and found clothing from the hotel. These are likely to have a relatively high reuse value and therefore will be of interest to collectors



Annex 1 – Questions for hotels

General questions

1. Name
2. Position
3. Which hotel / hotel chain do you represent?
4. How many hotels do you have in Copenhagen?
5. How many beds do these hotels have?
6. How many guest nights are there in these hotels each year?
7. How many hotel staff do you have in Copenhagen distributed between various functions?
8. What is the approx. gender distribution among your employees?
9. How to access textiles: 1) lease all textiles 2) Own all textiles 3) both buy and lease textiles
10. What types of textiles do you lease?
11. What types of textiles do you own?

Leased textiles

12. What leasing company do you lease through?
13. Under what circumstances are the textiles that you lease discarded?
14. Who decides whether the textiles are worn out or damaged?
15. When did you last change your logo or design (of textiles / uniforms)?
16. Does your contract with the leasing company include environmental requirements?
17. If so, are there requirements for 1) Eco-labeled textiles 2) Eco-labeled laundries 3) Environmentally friendly treatment of discarded textiles (e.g. recycling / recycling if possible)
18. If not, what prevents you from making environmental requirements on the leasing firm's treatment of discarded textiles?

Purchased textiles

19. What quantities of different types of textiles do you buy per year for your hotels in Copenhagen?
20. Do you buy eco-labeled textiles?
21. What types of textiles do you buy with eco-labels? (ie bed linen, uniforms, towels etc.)
22. Which eco-labels do these textiles have?
23. Under what circumstances are the textiles that you own discarded?
24. Who decides whether the textiles are worn-out or damaged?
25. When did you last change your logo or design (of textiles / uniforms)?
26. Who is responsible for handling discarded textiles?
27. Do you have a take-back system for uniforms?
28. What happens to discarded / take-back textiles?
29. Do you have a policy recycling / recycling of textiles? Please describe.
30. What obstacles are there to increase reuse / recycling?
31. What kind of help do you have need to be able to increase the share of reused / recycled textiles?

Textiles forgotten by guests

32. What quantity of clothing / textiles do you estimate that guests leave behind in your hotels in Copenhagen annually?
32. What do you do with the textiles that are not claimed by their owner?
33. If you do not donate these textiles for recycling / recycling, what prevents you from doing so?



Annex 2 - Questions for leasing companies

1. How many hotels in Copenhagen do you supply textiles for?
2. How many pieces of clothing do you supply per employee per year / how many pieces of clothing are in constant circulation for each employee?
 - cleaning staff
 - the kitchen staff
 - receptionists / bar staff
 - other staff
3. How many textiles are typically in circulation per bed / kitchen?
 - bed linen
 - towels
 - tea
 - tablecloths
 - other textiles
4. Can you state the total quantities of various textiles that you deliver to hotels in Copenhagen:
 - bed linen
 - towels
 - uniforms
 - tea
 - aprons
 - tablecloths
 - other textiles
5. What is the expected technical lifetime of the different textile categories?
6. Do you prioritize durability in the textiles you lease to hotels?
7. How do you determine when textiles are worn out?
8. What share of the textiles you deliver to hotels have logos?
9. Have you experienced that textiles must be disposed of due to new design or logo in connection with Hotels?
10. What losses do you experience in textiles supplied to hotels?
11. What do you typically do with discarded hotel textiles?
12. If they are not donated for reuse / recycling - what prevents you from doing this?



Annex 3 - Questions for collectors of used textiles

1. Do you receive textiles (primarily uniforms but also bed linen, etc.) from hotels? If so, how have these been donated?
2. Are there any reuse options for these textiles? Which?
3. If not, why? E.g. *Worn out already, logos make them less interesting, no markets for uniforms, other?*
4. Are there any recycling market for any types of hotel textiles? What types of textiles and which type of recycling?
5. What quantity of textiles should a hotel or hotel chain discard each year before it would make financial sense to place a used textile container at the premises?
6. Could you be interested in working more closely with hotels and hotel chains?
7. Do you have recommendations for hotels and leasing companies on how they should adjust textile design and management to ensure more recycling / recycling? Eg. *removable logos, more neutral design, avoid fiber blends, other?*